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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/774,826	01/30/2001	Mark A. Plummer	970019 USA	2489

7590 05/19/2003

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EXAMINER

GRIFFIN, WALTER DEAN

ART UNIT

PAPER NUMBER

1764

DATE MAILED: 05/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/774,826

Applicant(s)

PLUMMER ET AL.

Examiner

Walter D. Griffin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-22 and 26-33 is/are allowed.
- 6) ☒ Claim(s) 1-13, 17, 18, 23-25, 34, 36, 37 and 39-42 is/are rejected.
- 7) ☒ Claim(s) 14-16, 35 and 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

The declaration filed on February 27, 2003 under 37 CFR 1.131 is sufficient to overcome the Minhas et al. (US 2002/0111524 A1) reference.

New rejections follow.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 7-9, 11, 12, 34, 36, 37, 39, 40, and 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Sweet et al. (US 5,643,442).

The Sweet reference discloses a process for lowering the sulfur content of a hydrocarbon feed boiling in the 150° to 450°C range. Hydrocarbons boiling in this range would include the claimed hydrocarbon feeds. The process comprises contacting the feed with the first side of a selective solid membrane and contacting a sweep stream with the second side of the membrane. The sulfur compounds in the feed are then transported through the membrane to produce a sulfur-enriched permeate and a sulfur-depleted retentate. The sulfur-enriched permeate is then treated in a non-membrane process (i.e., hydrotreating) to reduce its content of sulfur. Specific membranes include polyurea/urethane and polyimide-containing membranes. See column 1,

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lines 31-64; column 2, lines 15-18; column 3, lines 1-14 and 43-67; column 4, lines 1-49; and column 7, lines 39-60.

Claims 1, 2, 4, 7-9, 11-13, 17, 23, 24, 34, 36, 37, 39, 40, and 42 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 2268186A.

The GB reference discloses a process for removing sulfur from a hydrocarbon stream. The process comprises conveying a feed stream such as a heavy naphtha to a selective membrane separation unit. The feed contacts a first side of the membrane, components from the feed diffuse through the membrane, and are removed from the downstream side of the membrane by use of a sweep liquid. The sweep liquid may be a saturated hydrocarbon liquid. This sweep liquid would serve the function of the claimed facilitated transport liquid. The stream that permeates through the membrane is rich in sulfur compounds. The retentate stream is a sulfur-depleted stream. The stream that permeates through the membrane is separated from the sweep stream and is then hydrotreated. Polyurea/urethane and polyimide membranes can be used in the process. See the first two paragraphs of page 1, the last paragraph of page 2, the last 5 lines of page 3, page 4, page 5, page 6, the first two lines of page 7, the last three paragraphs of page 8, page 9, and the paragraph bridging pages 10 and 11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5, 6, 10, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweet et al. (US 5,643,442).

The Sweet reference discloses a process for lowering the sulfur content of a hydrocarbon feed boiling in the 150° to 450°C range. Hydrocarbons boiling in this range would include the claimed hydrocarbon feeds. The process comprises contacting the feed with the first side of a selective solid membrane and contacting a sweep stream with the second side of the membrane. The sulfur compounds in the feed are then transported through the membrane to produce a sulfur-enriched permeate and a sulfur-depleted retentate. The sulfur-enriched permeate is then treated in a non-membrane process (i.e., hydrotreating) to reduce its content of sulfur. Specific membranes include polyurea/urethane and polyimide-containing membranes. See column 1, lines 31-64; column 2, lines 15-18; column 3, lines 1-14 and 43-67; column 4, lines 1-49; and

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column 7, lines 39-60.

The Sweet reference does not disclose the weight ratio of the sweep stream to the feed stream as in claims 5 and 6 and does not disclose the specific sulfur compounds.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by utilizing sweep stream to feed stream ratios as claimed because one would utilize amounts of sweep stream that result in the effective separation of the feed.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sweet by separating the claimed sulfur compounds because these compounds fall within the general class of compounds disclosed by Sweet and therefore would be expected to be effectively removed in the process of Sweet.

Claims 3, 5, 6, 10, 18, 25, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2268186A.

The GB reference discloses a process for removing sulfur from a hydrocarbon stream. The process comprises conveying a feed stream such as a heavy naphtha to a selective membrane separation unit. The feed contacts a first side of the membrane, components from the feed diffuse through the membrane, and are removed from the downstream side of the membrane by use of a sweep liquid. The sweep liquid may be a saturated hydrocarbon liquid. This sweep liquid would serve the function of the claimed facilitated transport liquid. The stream that permeates through the membrane is rich in sulfur compounds. The retentate stream is a sulfur-depleted stream. The stream that permeates through the membrane is separated from the sweep stream and is then

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hydrotreated. Polyurea/urethane and polyimide membranes can be used in the process. See the first two paragraphs of page 1, the last paragraph of page 2, the last 5 lines of page 3, page 4, page 5, page 6, the first two lines of page 7, the last three paragraphs of page 8, page 9, and the paragraph bridging pages 10 and 11.

The GB 2268186A reference does not disclose the sweep liquids of claim 3, does not disclose the weight ratio of the sweep stream to the feed stream as in claims 5 and 6, does not disclose the specific sulfur compounds, does not disclose the recycling of the sweep stream, and does not disclose hydrogenating the permeate stream before separating it from the sweep stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of GB 2268186A by utilizing the sweep liquids as in claim 3 because these liquids fall within the general class of liquids disclosed by the GB 2268186A reference and therefore would be effective sweep liquids.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of GB 2268186A by utilizing sweep stream to feed stream ratios as claimed because one would utilize amounts of sweep stream that result in the effective separation of the feed.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of GB 2268186A by separating the claimed sulfur compounds because these compounds fall within the general class of compounds disclosed by GB 2268186A and therefore would be expected to be effectively removed in the process of GB 2268186A.

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It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of GB 2268186A by recycling the recovered sweep liquid because the economics of the process will be improved.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of GB 2268186A by hydrotreating the combined permeate/sweep stream because sulfur content will be reduced regardless of whether or not the sweep stream is separated prior to hydrotreating.

Allowable Subject Matter

Claims 19-22 and 26-33 are allowed.

Claims 14-16, 35, and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose a process as claimed in which the specific facilitated transport liquids are used, does not disclose a process as claimed in which a decoupling agent is used, does not disclose a process as claimed in which sulfur species are complexed with the facilitated transport liquid, and does not disclose a process as claimed that uses the membranes of claims 35 and 38.

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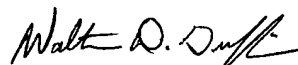
Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The White et al. reference discloses a membrane separation process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter D. Griffin whose telephone number is 703-305-3774. The examiner can normally be reached on Monday-Friday 6:30 to 4:00 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.



Walter D. Griffin
Primary Examiner
Art Unit 1764

WG
May 8, 2003